

Objections To The Specification

The abstract is objected to for its length. The Abstract has been amended to alleviate the Examiner's objection.

Objections To The Claims

Claims 1, 8, 12, 16 and 20 are objected to for containing numerous informalities.

Claims 16 and 20 have been cancelled and withdrawn from further consideration by the Examiner.

Claims 1, 8 and 12 have been amended to alleviate the Examiner's objections.

Claim Rejections Under 35 USC §112

Claim 12 is rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

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Claim 12 has been amended to alleviate the Examiner's rejection. A reconsideration for allowance of claim 12 is respectfully requested of the Examiner.

Claim Rejections Under 35 USC §102

Claims 16, 18 and 20 are rejected under 35 USC §102(e) as being anticipated by Flanigan et al.

Claims 16, 18 and 20 have been cancelled and withdrawn from further consideration by the Examiner.

Claim Rejections Under 35 USC §103

Claims 1-3, 5, 8-10, 12-16 and 18-19 are rejected under 35 USC §103(a) as being unpatentable over Moslehi.

Claims 16 and 18-20 have been cancelled and withdrawn from further consideration by the Examiner.

The rejection of claims 1-3, 5, 8-10 and 12-15 under 35 USC §103(a) based on Moslehi is respectfully traversed.

In the Response To Arguments section of the 11/06/01 Office Action, the Examiner notes that the Applicants argument that the Moslehi reference does not clearly teach, disclose or suggest a second plurality of linear grooves that are in fluid communication with each and every one of a first plurality of circular grooves, is not valid. The Examiner specifically cited Figure 3 of Moslehi and col. 7, lines 3-15 of the same reference. The Examiner further argued that the term "a first plurality of circular grooves" is subjected to broad interpretation and therefore, may mean only the innermost two concentric circular grooves, as shown in Figure 3 of Moslehi.

The rejection of claims 1-3, 5, 8-10 and 12-15 under 35 USC §103(a) based on Moslehi is respectfully traversed.

The Applicants respectfully submit that the interpretation of the claim language is defined by the specification, including the drawings. Furthermore, dependent claims 2 and 3 further define the term "first plurality" to be at least 3 (claim 2) or at least 5 (claim 3). Therefore, by the definition of the dependent claims, the specification and the drawings, the term "first plurality" necessarily means all the

circular grooves provided on the surface of the pedestal which would include all three circular grooves shown by Moslehi in Figure 3. The Applicants therefore respectfully submit that Moslehi does not teach the fluid communication between a second plurality of linear grooves with "each and every one of said first plurality of circular grooves" to allow a cooling fluid to flow therethrough.

Furthermore, claim 1 recites:

"said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 1 mm and about 7 mm, and a depth between about 1 mm and about 7 mm."

Such is not taught or disclosed by Moslehi. Similar limitations are contained in independent method claim 8.

The rejection of claims 1-3, 5, 8-10 and 12-15 under 35 USC §103(a) based on Moslehi is respectfully traversed. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

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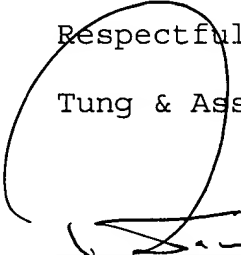
Based on the foregoing, the Applicants respectfully submit that all of the pending claims, i.e. claims 1-3, 5, 8-10 and 12-16, are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

Attached hereto is a marked-up version of the changes made to the claims and abstract by the current amendment. The attached page is captioned "Version With Markings To Show Changes Made".

In the event that the present invention is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Abstract

Please amend the Abstract as follows:

-A cooling stage for a semiconductor substrate and a method for utilizing such cooling stage for improved cooling of a semiconductor substrate. In the cooling stage, a pedestal that has a substantially planar top surface is equipped with a first plurality of circular grooves concentrically formed in the top surface and a second plurality of linear grooves formed in radial directions emanating from a center of the top surface in fluid communication with the first plurality of circular grooves to allow a cooling fluid to flow therethrough when a semiconductor substrate is positioned on the top surface of the stage. [The apparatus and method are effective in preventing wafer jump or wafer sticking problems frequently caused by an imbalance of thermal stresses in a top surface

and a bottom surface of a wafer that is inadequately cooled on a cooling stage.] -

In The Claims

Claims 16, 18, 19 and 20 have been cancelled without prejudice and withdrawn from further consideration by the Examiner.

Claim 1 has been amended as follows:

1. (Thrice Amended) A cooling stage for a semiconductor substrate comprising:

a pedestal having a substantially planar top surface,

a first plurality of circular grooves concentrically formed in said top surface, and

a second plurality of linear grooves formed in radial directions emanating from a center of said top surface in fluid communication with each and [everyone] every one of said first plurality of circular grooves allowing a cooling fluid to flow therethrough when said semiconductor substrate is positioned on said top surface of the pedestal, said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 1 mm and about 7 mm, and a depth between about 1 mm and about 7 mm.

Claim 8 has been amended as follows:

8. (Thrice Amended) A method for cooling a semiconductor substrate comprising the steps of:

providing a cooling stage comprising a wafer pedestal equipped with a grooved top surface thereon, said grooved top surface comprises a first plurality of circular grooves concentrically formed in said top surface and a second plurality of linear grooves formed in radial directions emanating from a center of said top surface in fluid communication with each and ~~[everyone]~~ every one of said first plurality of circular grooves, said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 1 mm and about 7 mm, and a depth between about 1 mm and about 7 mm,

positioning a heated semiconductor substrate on said grooved top surface,

flowing a cooling liquid through a cooling channel in said wafer pedestal to carry away heat transferred to said grooved top surface, and

flowing a cooling gas through said first and second plurality of circular and linear grooves to carry away heat from a backside of said heated semiconductor substrate.

Claim 12 has been amended as follows:

12. (Twice Amended) A method for cooling a semiconductor substrate according to claim 8 further comprising the step of providing said grooved top surface with [a] said first plurality of circular grooves and said second plurality of linear grooves[,] each having a width between about 3 mm and about 5 mm, and a depth of between about 1 mm and about 3 mm.